



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/935,255	08/22/2001	Ronald A. Weimer	MTI-31529	1208
------------	------------	------------------	-----------	------

31870 7590 11/19/2002

WHYTE HIRSCHBOECK DUDEK S.C.
111 E. WISCONSIN AVE.
SUITE 2100
MILWAUKEE, WI 53202

EXAMINER

CHEN, JACK S J

ART UNIT	PAPER NUMBER
----------	--------------

2813

DATE MAILED: 11/19/2002

5

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/935,255

Applicant(s)

Weimer

Examiner

Jack Chen

Art Unit

2813



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 30 Days MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Sep 3, 2002
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-57 and 73-96 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claims 1-57 and 73-96 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other:

Art Unit: 2813

DETAILED ACTION

Election/Restriction

1. This application contains claims directed to the following patentably distinct species of the claimed invention:

Species 1, claims 1-17 drawn to method for forming silicon nitride barrier by exposing the silicon layer to nitrogen-containing species.

Species 2, claim 18 drawn to method for forming silicon nitride barrier by thermally annealing the silicon layer in nitrogen-containing species.

Species 3, claims 19-22 drawn to method for forming silicon nitride barrier by nitridizing the silicon layer.

Species 4, claims 23-24 drawn to method for forming nitride barrier by exposing the silicon layer to a plasma source of a nitrogen-containing species.

Species 5, claims 25-26 drawn to method for forming nitride barrier by exposing the silicon layer to a remote microwave plasma source of a nitrogen-containing species.

Species 6, claim 27 drawn to method for forming nitride barrier by exposing the silicon layer to an inductive couple plasma source of a nitrogen-containing species.

Species 7, claims 28-35, 36, 38 drawn to method for forming a semiconductor device by nucleating the dielectric layer with silicon.

Art Unit: 2813

Species 8, claim 37 drawn to method for forming a semiconductor device by nucleating the dielectric layer with silicon and thermally annealing the silicon with nitrogen-containing gas.

Species 9, claims 39-40 drawn to method for forming a semiconductor device by nucleating the dielectric layer with silicon and exposing the silicon to a plasma source of a nitrogen-containing species.

Species 10, claim 41 drawn to method for forming a semiconductor device by nucleating the dielectric layer with silicon and exposing the silicon to a remote microwave plasma source of a nitrogen-containing species.

Species 11, claims 42-44 drawn to method for forming a gate electrode by nucleating the dielectric layer with silicon.

Species 12, claim 45 drawn to method for forming a gate electrode by thermally annealing the silicon layer in a nitrogen-containing species.

Species 13, claim 46 drawn to method for forming a gate electrode by nitridizing the silicon layer.

Species 14, claims 47-48 drawn to method for forming a gate electrode by using specific parameters.

Species 15, claims 49-50 drawn to method for forming a gate electrode by exposing the silicon layer to a plasma source of a nitrogen-containing species.

Species 16, claim 51 drawn to method for forming a gate electrode by exposing the silicon layer to a remote microwave plasma source of a nitrogen-containing species.

Art Unit: 2813

Species 17, claim 52 drawn to method for forming a gate electrode by exposing the silicon layer to an inductive couple plasma source of a nitrogen-containing species.

Species 18, claims 53-57 drawn to method for forming a gate electrode by further forming polysilicon layer.

Species 19, claims 73-74 drawn to method for forming a nitride barrier layer by exposing the silicon to a nitrogen gas.

Species 20, claim 75 drawn to method for forming a nitride barrier layer by nucleating the dielectric with silicon and exposing the silicon to a nitrogen gas.

Species 21, claims 76-79 drawn to method for forming a nitride barrier layer by chemical vapor deposition and exposing the silicon to a nitrogen gas.

Species 22, claims 80 drawn to method for forming a nitride barrier layer having the specified thickness by nucleating the dielectric layer with silicon and thermally annealing the silicon in a nitrogen gas.

Species 23, claims 81-82 drawn to method for forming a nitride barrier layer by nucleating the dielectric layer with silicon and thermally annealing the silicon in a nitrogen gas.

Species 24, claims 83-84 drawn to method for forming a nitride barrier layer by using specific low pressure, thickness and thermally annealing the silicon in a nitrogen gas.

Species 25, claim 85 drawn to method for forming a nitride barrier layer by nitridizing the silicon with a plasma source of nitrogen.

Art Unit: 2813

Species 26, claim 86 drawn to method for forming a gate electrode by exposing the silicon on the gate oxide to a nitrogen gas to form a silicon nitride layer over the gate oxide layer.

Species 27, claim 87 drawn to method for forming a gate electrode by using chemical vapor deposition and exposing the silicon on the gate oxide to a nitrogen gas to form a silicon nitride layer over the gate oxide layer.

Species 28, claim 88 drawn to method for forming a gate electrode by using specified parameters such as pressure and thickness.

Species 29, claim 89 drawn to method for forming a gate electrode by nucleating the gate oxide with silicon and thermally annealing the silicon in the nitrogen gas to form the silicon nitride over the gate oxide.

Species 30, claim 90 drawn to method for forming a gate electrode by using specified parameters such as pressure and thickness and nucleate the gate oxide with silicon and thermally annealing the silicon in the nitrogen gas to form the silicon nitride over the gate oxide.

Species 31, claim 91 drawn to method for forming a gate electrode by depositing the silicon and nitridizing the silicon on the gate oxide with a plasma source of nitrogen to form a silicon nitride barrier layer over the gate oxide.

Species 32, claims 92-96 drawn to method for forming a gate electrode by nucleating the gate oxide with silicon and forming a conductive layer over the silicon nitride barrier layer.

Art Unit: 2813

2. Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claims are generic.
3. Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.
4. Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).
5. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.
6. Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

Art Unit: 2813

7. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(I).

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Chen whose telephone number is (703) 308-5838. The examiner can normally be reached on Monday-Friday (alternate Monday off) from 8:30 am to 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached on (703)308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.


Jack Chen

November 18, 2002